

Light:

- All segments of the electromagnetic Spectrum travel the same velocity through a vacuum: $v = 3 \times 10^8 \text{ m/s}$.

This is so important, it gets its own letter: c (speed of light).

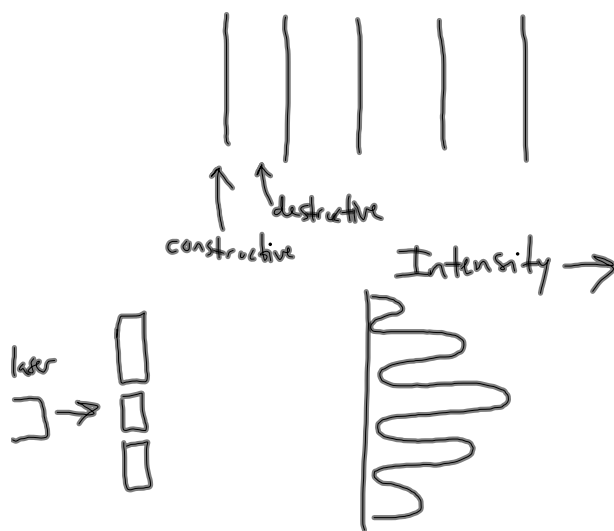
- Energy of light is related to its frequency:

$$E = hf$$
$$= \frac{hc}{\lambda}$$

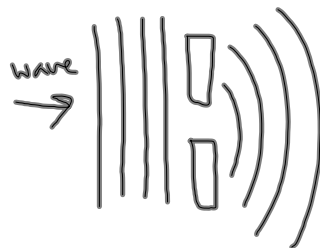
h is a constant called Planck's constant.

$$h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$$

- Wave/particle duality:
 - We have done experiments to show that light behaves as a wave and as a particle.
 - Light as a wave → double-slit experiment showed constructive and destructive interference



- Diffraction → spreading of a wave after it goes through an opening



- Particles were "discovered" through photoelectric effect experiment.
- Particles of light are called photons.

- Photons do not have mass, but they do have momentum.
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- When light travels, three things can happen when it hits something:

- Transmission
 - Reflection
 - Absorption
- } in real interaction all three happen

- Transmission:

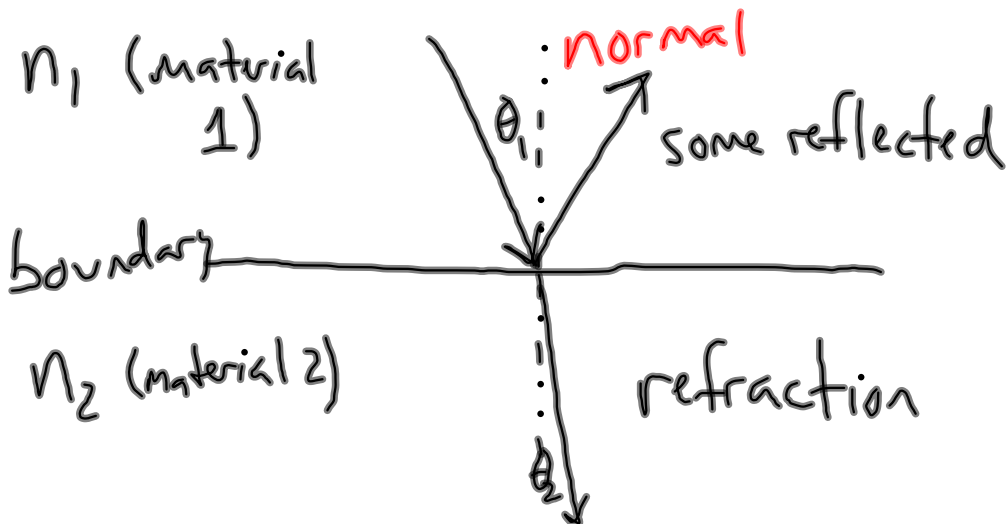
- Light going through something
- Think glass
- Light goes slower in the medium, depending on the index of refraction of the medium.

n = index of refraction^{of light}

$$n = \frac{c}{v}$$

c → speed in vacuum
 v → speed in medium of light

- When light enters a material at some angle, it leaves the boundary at a different angle.



- Snell's Law: $n_1 \sin \theta_1 = n_2 \sin \theta_2$